38YSA
Heat Pump—Outdoor Section

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Installation and Start-Up Instructions

NOTE: Read the entire instruction manual before starting the installation.

This symbol → indicates a change since the last issue.

SAFETY CONSIDERATION

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and the National Electrical Code (NEC) for special installation requirements.

Recognize safety information. This is the safety-alert symbol ⚠ . When you see this symbol on the unit or in instructions and manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage.

⚠ WARNING

Before installing or servicing system, always turn off main power to system. There may be more than 1 disconnect switch. Turn off accessory heater power if applicable. Electrical shock can cause personal injury or death.

INSTALLATION

Step 1—Check Equipment and Jobsite

UNPACK UNIT — Move to final location. Remove carton, taking care not to damage unit.

INSPECT EQUIPMENT — File claim with shipping company, prior to installation, if shipment is damaged or incomplete. Locate unit rating plate on unit corner panel.

It contains information needed to properly install unit. Check rating plate to be sure unit matches job specifications.

Step 2—Install on a Solid, Level Mounting Pad

If conditions or local codes require unit be attached to pad, tie-down bolts should be used and fastened through knockouts provided in unit base pan. Refer to unit mounting pattern in Fig. 2 to determine base pan size and knockout hole location.

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Allow 30-in. clearance to service end of unit and 48 in. above unit. For proper airflow, a 6-in. clearance on 1 side of unit and 12 in. on all remaining sides must be maintained. Maintain a distance of 24 in. between units. Position so snow or ice from roof or eaves cannot fall directly on unit.

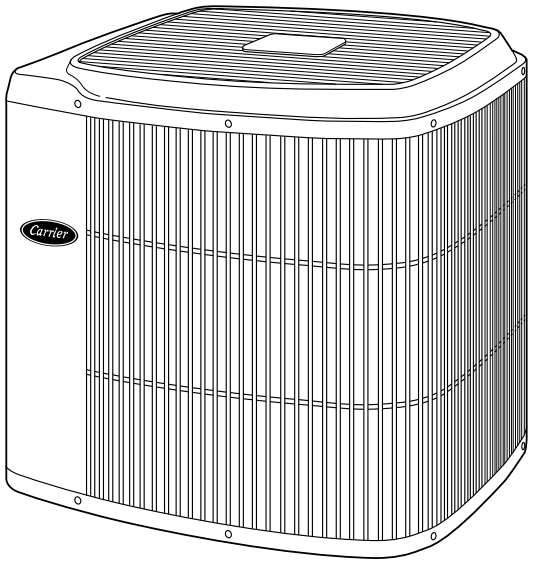

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Fig. 1—Model 38YSA

On rooftop applications, locate unit at least 6 in. above roof surface. Place unit above a load-bearing wall and isolate unit and tubing set from structure. Roof-mounted units exposed to winds above 5 mph may require wind baffles to achieve adequate defrost. Consult low-ambient guideline for wind baffle construction.

Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Consult local codes governing rooftop applications.

NOTE: Unit must be level to within ±2° per compressor manufacturer specifications.

Step 3—Elevate Unit

For proper drainage, heat pump must be raised off of mounting surface. Fig. 3 shows unit with accessory heat pump feet installed. Use accessory heat pump snow rack in areas where prolonged subfreezing temperatures or heavy snow occur. Refer to separate Installation Instructions packaged with accessories.

⚠ CAUTION

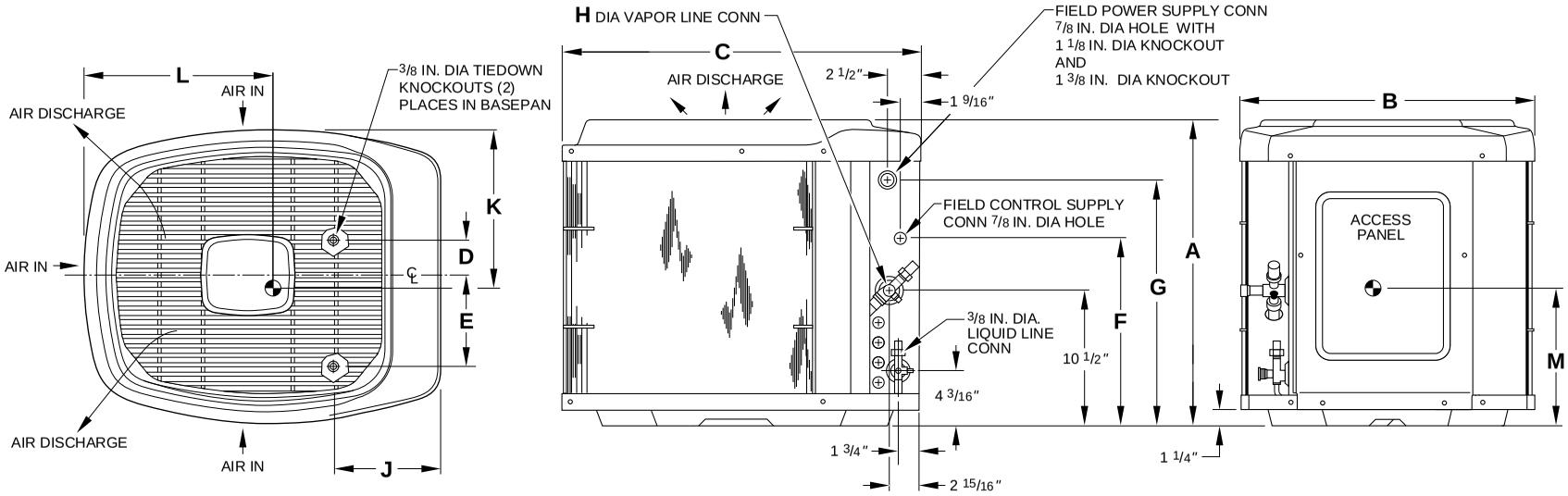
For proper unit operation and reliability, this unit must be installed with hard shutoff TXV on indoor section. Do not install with evaporator coils having capillary tube or piston-type metering devices.

Step 4—Thermostatic Expansion Valve

The outdoor section is factory equipped with a hard shutoff TXV for metering refrigerant during heating mode. See Fig. 4-6 for location of TXV and sensing bulb in system.

NOTES:

1. Allow 30 in. clearance to service side of unit, 48 in. above unit, 6 in. on one side, 12 in. on remaining side, and 24 in. between units for proper airflow.
2. Minimum outdoor operating ambient in cooling mode is 55°F (unless low ambient control is used) max 125°F.
3. Maximum outdoor operating ambient in heating mode is 66°F.
4. Series designation is the 13th position of the unit model number.
5. Center of gravity ◔.



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→ Dimensions (In.)

UNIT SIZE	SERIES	UNIT DIMENSIONS												MINIMUM MOUNTING PAD DIMENSIONS	
		A	B	C	D	E	F	G	H	J	K	L	M	Support Feet	Snow Stand
024	1	33-13/16	30	34-15/16	4	9-3/4	21-1/2	27-7/8	5/8	8-3/16	16-13/16	20-1/2	14	26 X 32	31 X 35
030	1	39-13/16	30	34-15/16	4	9-3/4	27-1/2	33-7/8	3/4	8-3/16	16-1/2	20-3/8	15	26 X 32	31 X 35
036	1	39-13/16	30	34-15/16	4	9-3/4	27-1/2	33-7/8	3/4	8-3/16	16-1/2	20-3/8	16	26 X 32	31 X 35
042	1	39-13/16	30	34-15/16	4	9-3/4	27-1/2	33-7/8	7/8	8-3/16	16-1/2	20-3/8	15	26 X 32	31 X 35
048	1	33-13/16	38-5/8	45	5-5/16	11-13/16	21-1/2	27-7/8	7/8	8-9/16	19-1/2	25-1/2	16	34 X 42	36 X 46

Fig. 2—Unit Reference Drawing

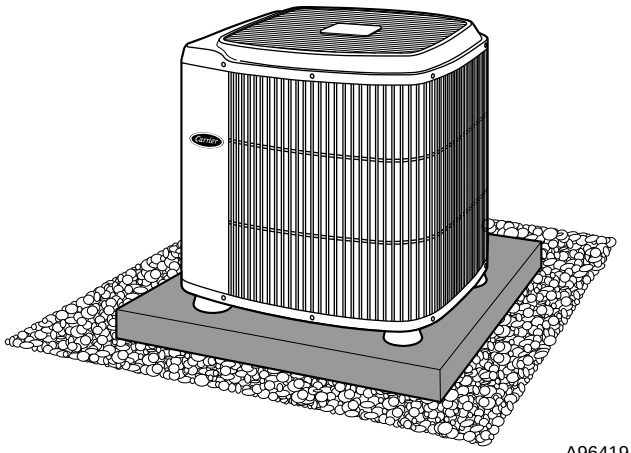

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Fig. 3—Accessory Heat Pump Feet

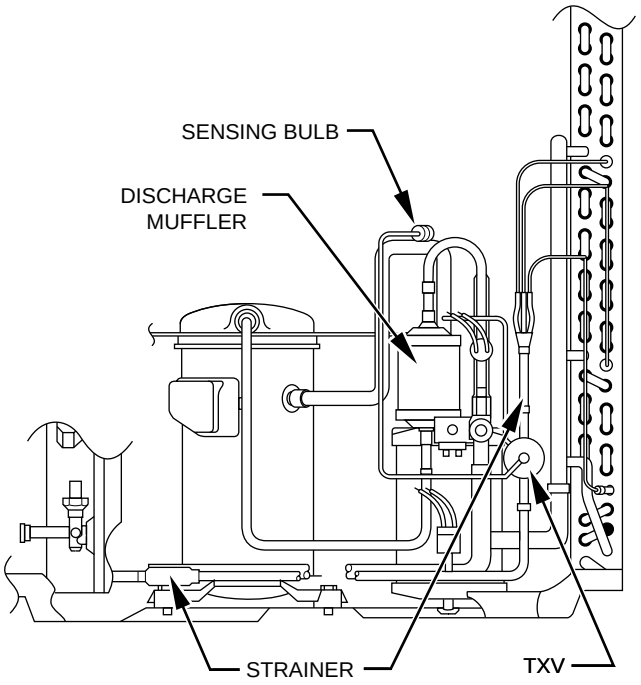

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Fig. 4—TXV Location on Outdoor Section

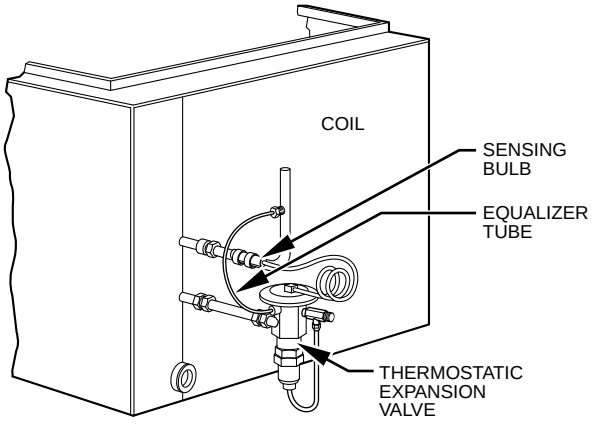

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Fig. 5—Typical TXV Installation on Indoor Section

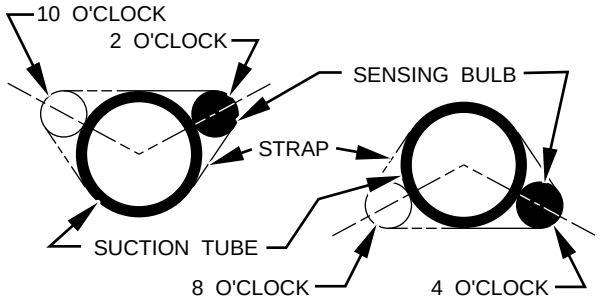

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Fig. 6—Positioning of Sensing Bulb

⚠ CAUTION

DO NOT BURY MORE THAN 36 IN. OF REFRIGERANT TUBING IN GROUND. If any section of tubing is buried, there must be a 6-in. vertical rise to the valve connections on the outdoor unit. If more than the recommended length is buried, refrigerant may migrate to cooler buried section during extended periods of unit shutdown, causing refrigerant slugging and possible compressor damage at start-up.

⚠ CAUTION

Due to system design, this unit must be installed with a factory-listed indoor section. Non-approved coils could cause performance and reliability problems. Refer to pre-sale literature for approved indoor sections.

Step 5—Check Defrost Thermostat

Check defrost thermostat to ensure it is properly located and securely attached. There is a liquid header with a brass distributor and feeder tube going into the outdoor coil. At the end of 1 of the feeder tubes there is a 3/8-in. OD stub tube approximately 3-in. long. (See Fig. 7.)

The defrost thermostat should be located on the stub tube. Note that there is only 1 stub tube used with the liquid header and on most units it will be the bottom circuit.

Step 6—Make Piping Connections

Outdoor units may be connected to indoor sections using service parts tubing package or field-supplied refrigerant grade tubing of correct size and condition. For tubing requirements beyond 50 ft, substantial capacity and performance losses can occur. Following the Long-Line Application Guideline, which is available from your local distributor, will reduce these losses and improve system reliability. Refer to Fig. 8 for field tubing equivalent line length.

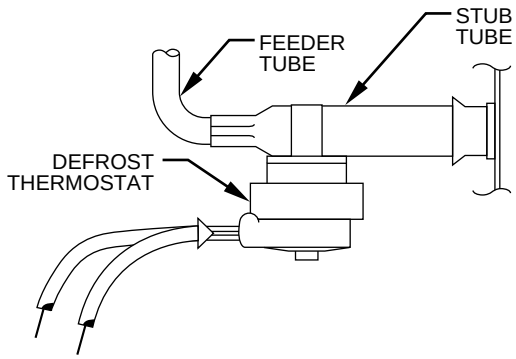

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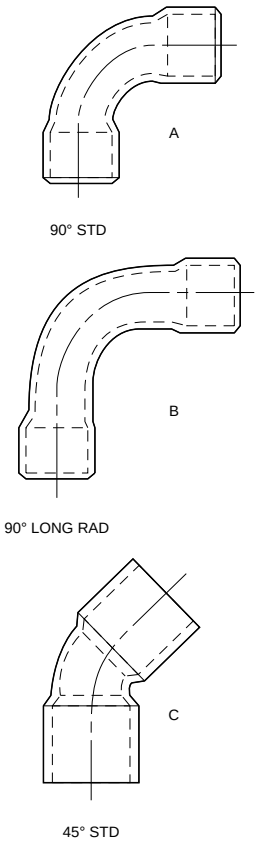
Fig. 7—Defrost Thermostat Location



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Fitting Losses in Equivalent Ft

TUBE SIZE OD (IN.)	90° STD FIG. 8-A	90° L.R. FIG. 8-B	45° STD FIG. 8-C
5/8	1.6	1.0	0.8
3/4	1.8	1.2	0.9
7/8	2.0	1.4	1.0
1-1/8	2.6	1.7	1.3

Fig. 8—Tube Bend Losses for Long Lines

NOTE: In some cases noise in the living area has been traced to gas pulsations from improper installation of equipment.

INSTALLATION RECOMMENDATIONS

1. Locate unit away from windows, or areas where unit operating sounds may disturb customer.
2. Ensure that vapor and liquid tube diameters are appropriate to capacity of unit. (See Table 1.)

→ Table 1—Refrigerant Connections and Recommended Liquid- and Vapor-Tube Diameters

UNIT SIZE	LIQUID (IN.)		VAPOR (IN.)		VAPOR (LONG LINE) (IN.)	
	Connect Dia	Tube Dia	Connect Dia	Tube Dia	Connect Dia	Tube Dia
024	3/8	3/8	5/8	5/8	5/8	3/4
030, 036	3/8	3/8	3/4	3/4	3/4	7/8
042, 048	3/8	3/8	7/8	7/8	7/8	7/8

Note: Tube diameters are for lengths up to 50 ft. For tubing lengths greater than 50 ft, consult Long-Line Application Guideline.

3. Run refrigerant tubes as directly as possible by avoiding unnecessary turns and bends.
4. Leave some slack between structure and unit to absorb vibration.
5. When passing refrigerant tubes through wall, seal opening with RTV or other pliable silicon-based caulk. (See Fig. 9.)
6. Avoid direct lineset contact with water pipes, ductwork, floor joists, wall studs, floors, and walls.
7. Do not suspend refrigerant tubing from joists and studs with a rigid wire or strap which comes in direct contact with tubing. (See Fig. 9.)
8. Ensure that tubing insulation is pliable and it completely surrounds vapor tube.
9. When necessary, use hanger straps which are 1 in. wide and conform to shape of tubing insulation. (See Fig. 9.)
10. Isolate hanger straps from insulation by using metal sleeves bent to conform to shape of insulation.

If refrigerant tubes or indoor coil is exposed to atmospheric conditions for longer than 5 minutes, it must be evacuated to 500 microns to eliminate contamination and moisture in the system.

OUTDOOR UNITS CONNECTED TO FACTORY-APPROVED INDOOR UNITS — Outdoor unit contains correct system refrigerant charge for operation with indoor approved unit when connected by 15 ft of field-supplied or factory accessory tubing. Check refrigerant charge for maximum efficiency. (See Step 10—Checking Charge.)

REFRIGERANT TUBING — Connect tubing to fittings on outdoor unit vapor- and liquid-service valves. (See Fig. 2.)

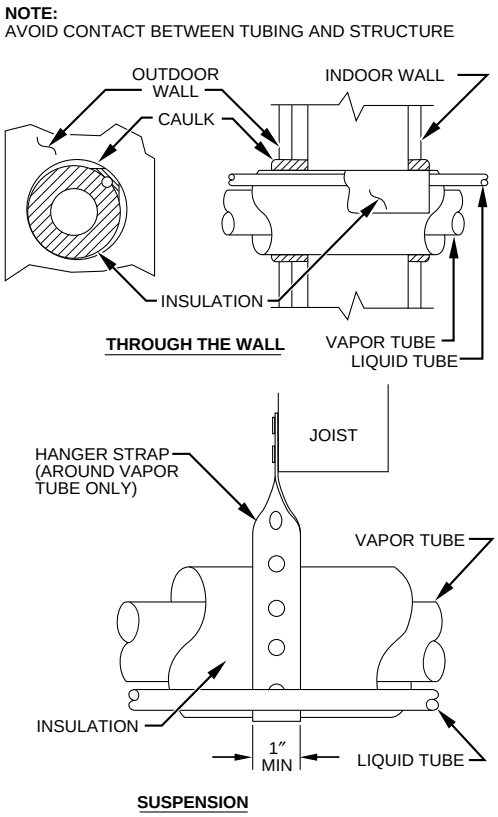

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Fig. 9—Piping Installation

⚠ CAUTION

To avoid valve damage while brazing, service valves must be wrapped with a heat-sinking material such as a wet cloth.

SWEAT CONNECTION — Use refrigerant grade tubing. Service valves are closed from factory and ready for brazing. After wrapping service valve with a wet cloth, tubing set can be brazed to service valve using either silver bearing or non-silver bearing brazing material. Consult local code requirements. Refrigerant tubing and indoor coil are now ready for leak testing. This check should include all field and factory joints. Check factory tubing on both indoor and outdoor unit to ensure tubes are not rubbing each other or any sheet metal. Pay particular attention to feeder tubes, making sure wire ties on feeder tubes are secure and tight.

⚠ CAUTION

A brazing shield MUST be used when tubing sets are being brazed to the service valves to prevent damage to the painted unit surface.

⚠ WARNING

Relieve all pressure before refrigerant system repair or final unit disposal to avoid personal injury or death. Use all service ports and open all flow-control devices, including solenoid valves.

⚠ CAUTION

Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

Step 7—Make Electrical Connections

⚠ WARNING

To avoid personal injury or death, do not supply power to unit with compressor terminal box cover removed.

Be sure field wiring complies with local and national fire, safety, and electrical codes, and voltage to system is within limits shown on unit rating plate. Contact local power company for correction of improper voltage. See unit rating plate for recommended circuit protection device.

⚠ WARNING

According to NEC, ANSI/NFPA 70, and local codes, the cabinet must have an uninterrupted or unbroken ground, to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes. Failure to follow this warning could result in electric shock, fire, or death.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect unit reliability. See unit rating plate. Do not install unit in system where voltage or phase imbalance may fluctuate above or below permissible limits.

NOTE: Use copper wire only between disconnect switch and unit.

NOTE: Install branch circuit disconnect per NEC of adequate size to handle unit starting current. Locate disconnect within sight from and readily accessible from unit, per Section 440-14 of NEC.

ROUTE GROUND AND POWER WIRES — Remove access panel and control box cover to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box. (See Fig. 2.)

CONNECT GROUND AND POWER WIRES — Connect ground wire to ground connection in control box for safety. Connect power wiring to contactor as shown in Fig. 10.

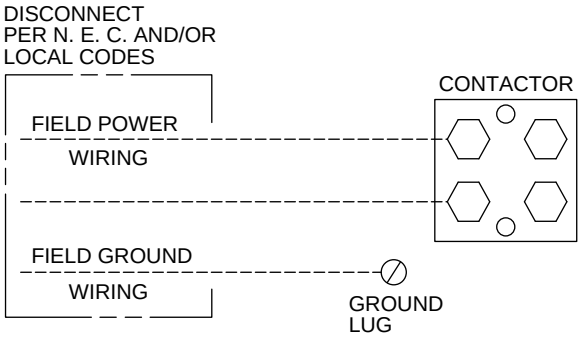


Fig. 10—Line Power Connections

CONNECT CONTROL WIRING — Route 24-v control wires through control wiring grommet and connect leads to control wiring pigtails from terminal board. (See Fig. 12.)

Use No. 18 AWG color-coded, insulated (35° C minimum) wires. If thermostat is located more than 100 ft from unit (as measured along control voltage wires), use No. 16 AWG color-coded wires to avoid excessive voltage drop.

Use furnace transformer, fan coil transformer, or accessory transformer for control power, 24-v/40-va minimum.

Check factory wires and wire connections to ensure terminations are secured properly.

Check wire routing to ensure wires are not in contact with tubing, sheet metal, etc.

NOTE: Use of available 24-v accessories may exceed the minimum 40-va power requirement. Determine total transformer loading and increase the transformer capacity or split the load with an accessory transformer as required.

NOTE: The defrost timer is factory set for 90-minute cycles. The timer can be field set for 30- and 50-minute cycles depending on defrost conditions in your geographical location.

Step 8—Install Electrical Accessories

Refer to individual instructions packaged with kits or accessories when installing.

⚠ CAUTION

Damage may occur to the scroll compressor if operated at a negative suction pressure during a system pumpdown.

Step 9—Start-Up

1. Fully back seat (open) liquid- and vapor-tube service valves.
2. Unit is shipped with valve stem(s) front seated, and caps installed. Replace stem caps after system is opened to refrigerant flow (back seated). Replace caps finger tight and tighten an additional 1/6 turn using a backup wrench on valve body flats to prevent distortion of sheet metal.
3. Close electrical disconnects to energize system.
4. Set room thermostat at desired temperature.
5. Set room thermostat at HEAT or COOL and fan at ON or AUTO, as desired. Operate unit for 15 minutes. Check system refrigerant charge. (See Step 10.)

SEQUENCE OF OPERATION — With power supplied to indoor and outdoor units, transformer is energized.

Cooling

On a call for cooling, the thermostat makes circuits R-O, R-Y, and R-G. Circuit R-O energizes the reversing valve, switching it to cooling position. Circuit R-Y energizes contactor, starting outdoor fan motor and compressor circuit. R-G energizes indoor unit blower relay, starting indoor blower motor on high speed.

When thermostat is satisfied, its contacts open, de-energizing contactor and blower relay. Compressor and motors should stop.

Heating

On a call for heating, the thermostat makes circuits R-Y and R-G. Circuit R-Y energizes contactor, starting outdoor fan motor and compressor. Circuit R-G energizes indoor blower relay, starting blower motor on high speed.

Should the temperature continue to fall, R-W2 is made through second-stage room thermostat bulb. Circuit R-W2 energizes a sequencer, bringing on first bank of supplemental electric heat and providing electrical potential to second heater sequencer (if used). If outdoor temperature falls below the setting of outdoor thermostat, (field-installed option) contacts close to complete circuit and bring on second bank of supplemental electric heat.

When thermostat is satisfied, its contacts open, de-energizing contactor and sequencer. All heaters and motors should stop.

Defrost

The defrost control is a time/temperature control which includes a field-selectable (quick connects located at board edge) time period between defrost cycles (30, 50, and 90 minutes), factory set at 90 minutes.

The electronic timer and defrost cycle will start only when contactor is energized and defrost thermostat is closed.

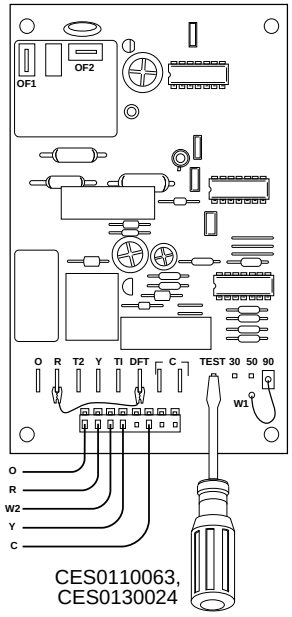
The defrost mode is identical to cooling mode except that the outdoor fan motor stops and second-stage heat is turned on to continue warming conditioned space.

To initiate defrost, the defrost thermostat must be closed. This can be accomplished as follows:

1. Turn off power to outdoor unit.
2. Disconnect outdoor fan motor lead from OF2 on control board. Tape lead to prevent grounding.
3. Restart unit in heating mode, allowing frost to accumulate on outdoor coil.
4. After a few minutes in heating mode, liquid-line temperature should drop below the closing point of defrost thermostat, approximately 30˚F.
5. Short between speed-up terminals with a flat bladed screwdriver. (See Fig. 11.) This reduces the timing sequence to 1/256 of the original time.
6. When you hear reversing valve change position, remove screwdriver immediately. Otherwise the control will terminate normal 10-minute defrost cycle in approximately 2 sec.

NOTE: Length of defrost cycle will be dependent upon the length of time it takes to remove screwdriver from test pins after reversing valve has shifted.

7. Unit will remain in defrost for remainder of defrost cycle time or until defrost thermostat reopens.



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Defrost Control Speed-Up Timing Sequence for CES0110063/CES0130024

PARAMETER	MINIMUM	MAXIMUM	SPEED-UP (NOMINAL)
30-min cycle	27	33	7 sec
50-min cycle	45	55	12 sec
90-min cycle	81	99	21 sec
10-min cycle	9	11	2 sec
5-min cycle	4.5	5.5	1 sec

Fig. 11—Defrost Control

Step 10—Checking Charge

⚠ CAUTION

Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

Factory charge is shown on unit rating plate. (See Fig. 2.)

⚠ WARNING

Service valve gage ports are not equipped with Schrader valves. To prevent personal injury, make sure gage manifold is connected to the valve gage ports before moving valves off fully back seated position. Wear safety glasses and gloves when handling refrigerant.

⚠ CAUTION

Compressor damage may occur if system is overcharged.

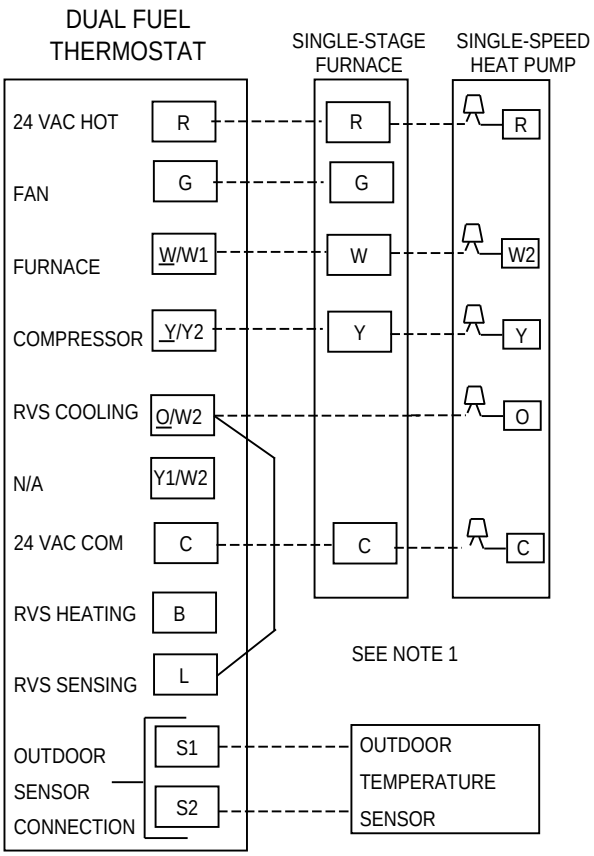
Check charge in cooling and heating mode by following procedure shown on subcooling charging tables located on unit information plate.

CARE AND MAINTENANCE

For continuing high performance, and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. Consult User's Manual for proper frequency of maintenance. Frequency of maintenance may vary depending upon geographic areas, such as coastal applications.

Step 1—Leave User's Manual with Homeowner

Explain system operation and maintenance procedures outlined in User's Manual.



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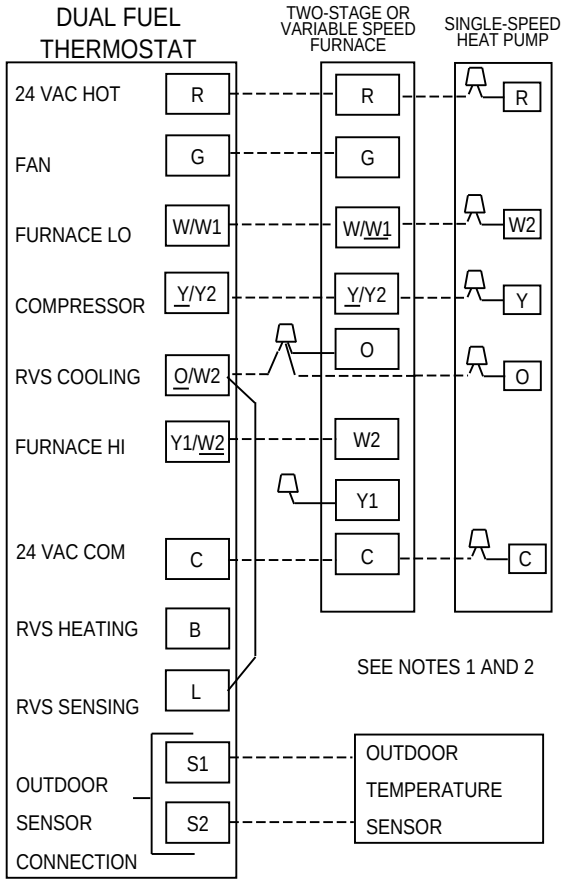

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WIRING DIAGRAM NOTES FOR DUAL FUEL THERMOSTAT:

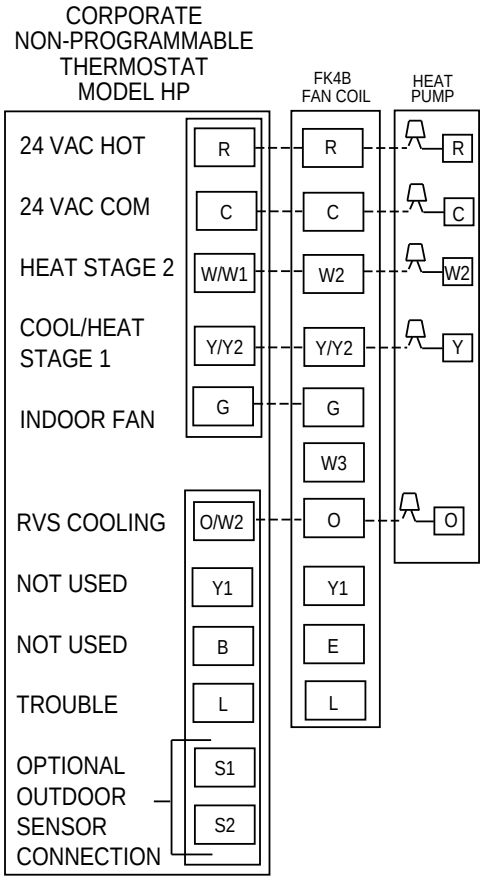
1. Underlined letters on dual terminal indicates its usage.
   For Example: O/W2 means O
   O/W2 means W2

   Outdoor Temperature Sensor must be attached in all dual fuel installations.

   Jumper wire between O/W2 and L thermostat terminals MUST be present.

2. Y1 and O connections to 2-stage furnaces MAY NOT EXIST, or may only be a wire rather than a screw terminal.

Fig. 12—Typical Circuit Connections



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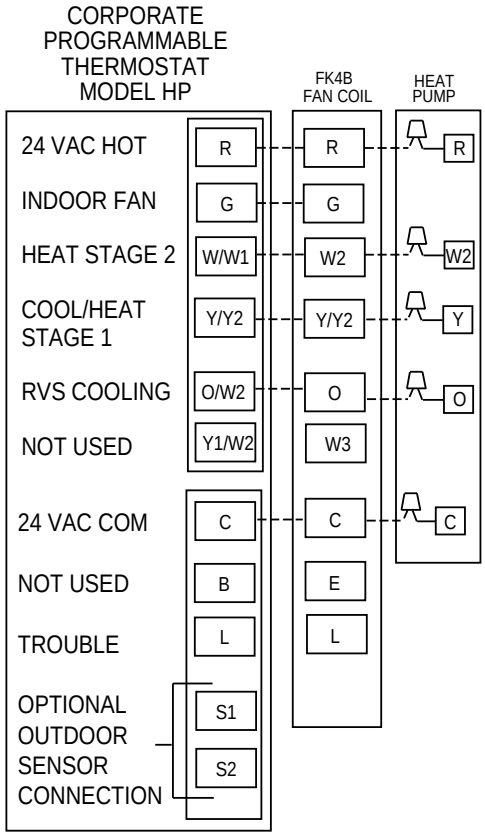

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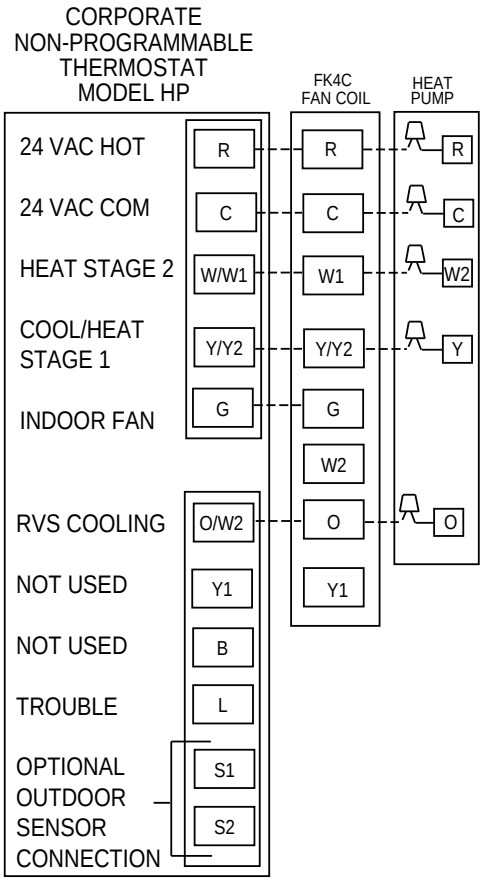

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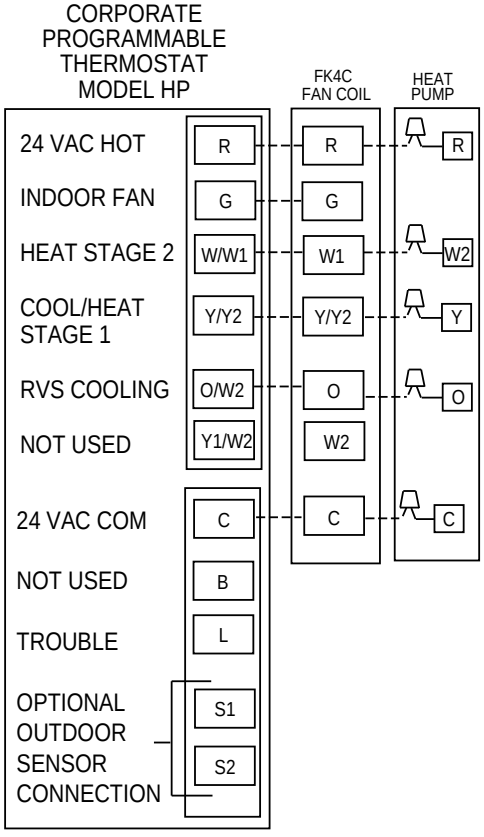

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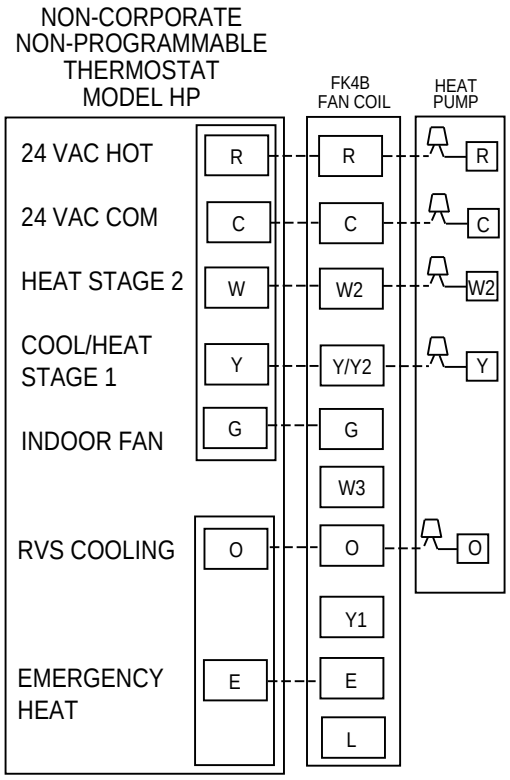
Fig. 12—Typical Circuit Connections (continued)



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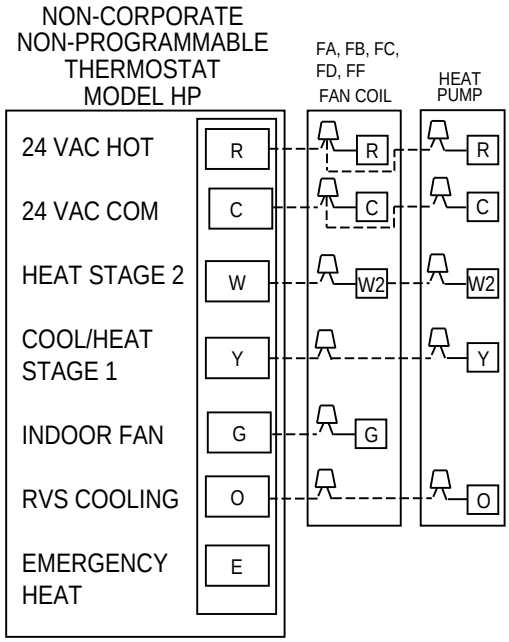

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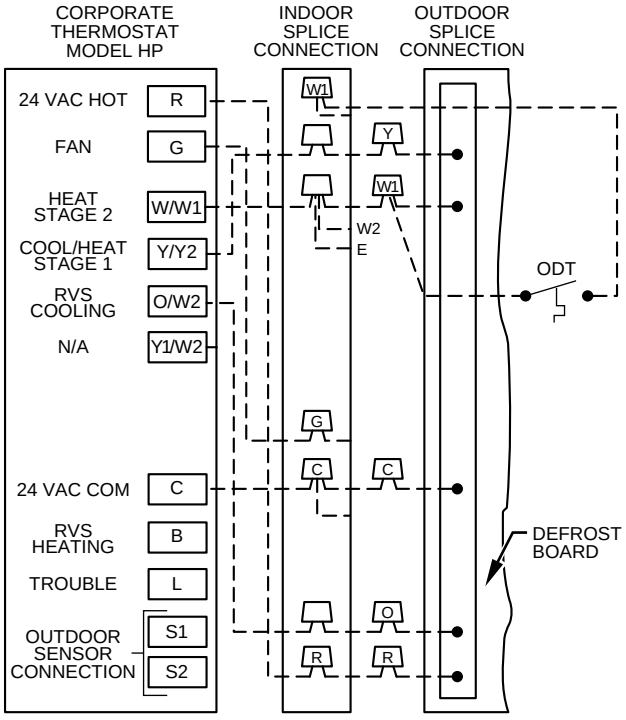
SYSTEM WITH ONE OUTDOOR THERMOSTAT



USED WITH FB4, FB5, FC4, FA4, FH4 FAN COILS
(WITH 1 OUTDOOR TSTAT)

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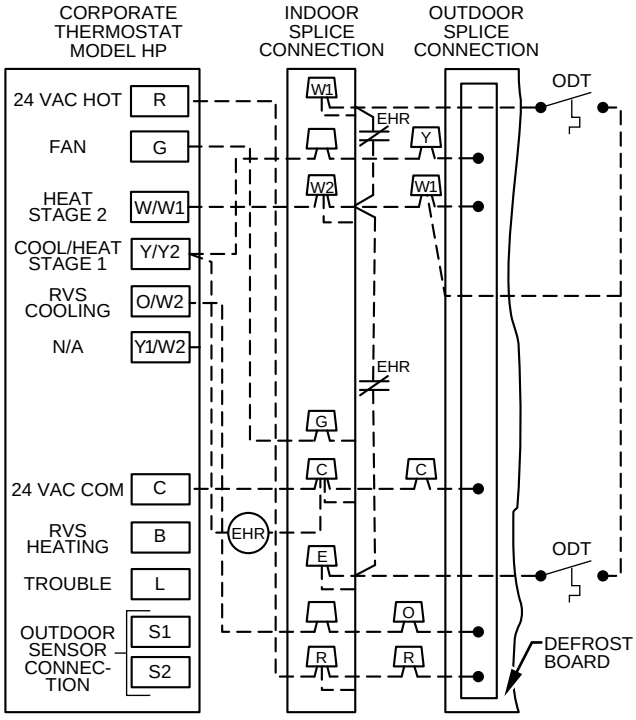
SYSTEM WITH TWO OUTDOOR THERMOSTATS



USED WITH FB4, FB5, FC4, FA4, FH4 FAN COILS
(WITH 2 OUTDOOR TSTATS)

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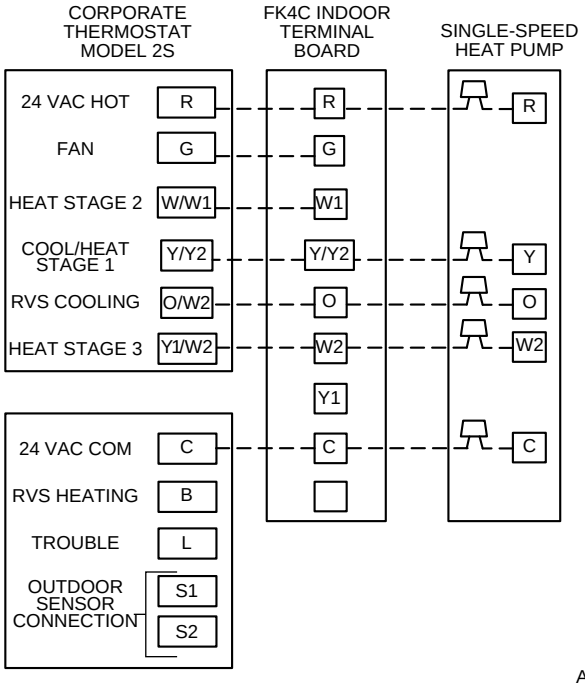
Fig. 12—Typical Circuit Connections (continued)



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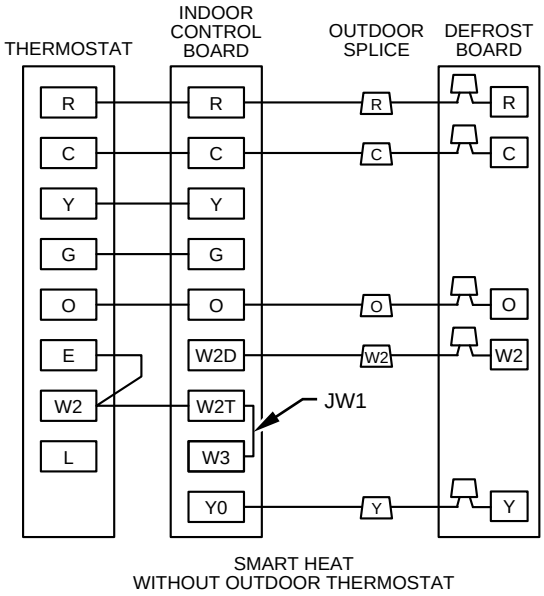
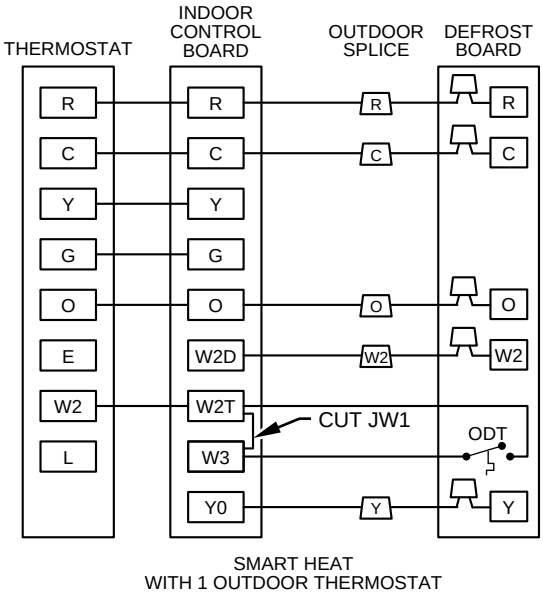


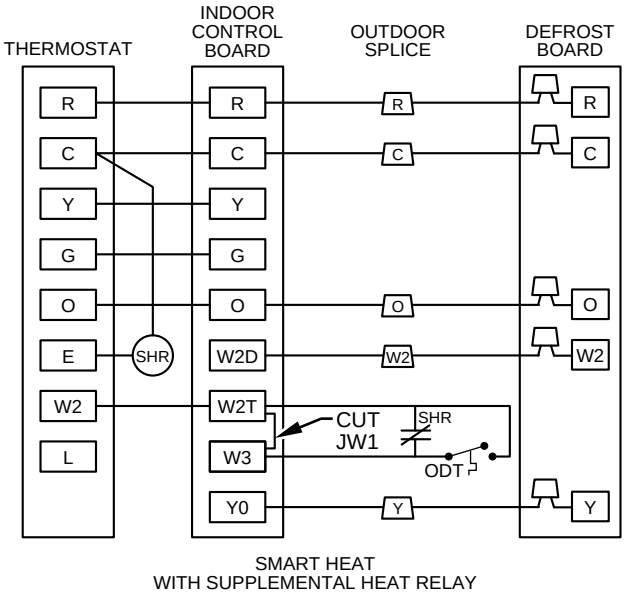
SMART HEAT
WITHOUT OUTDOOR THERMOSTAT

A96533



SMART HEAT
WITH 1 OUTDOOR THERMOSTAT

A96534

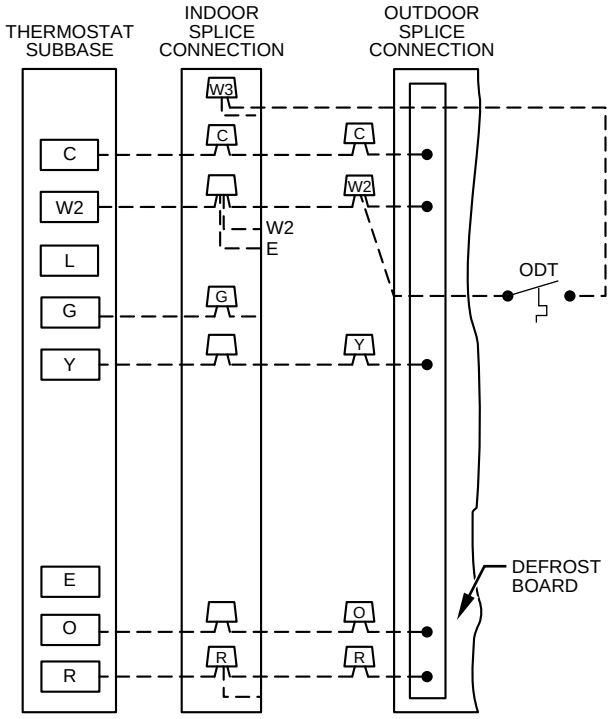


SMART HEAT
WITH SUPPLEMENTAL HEAT RELAY

A96535

Fig. 12—Typical Circuit Connections (continued)

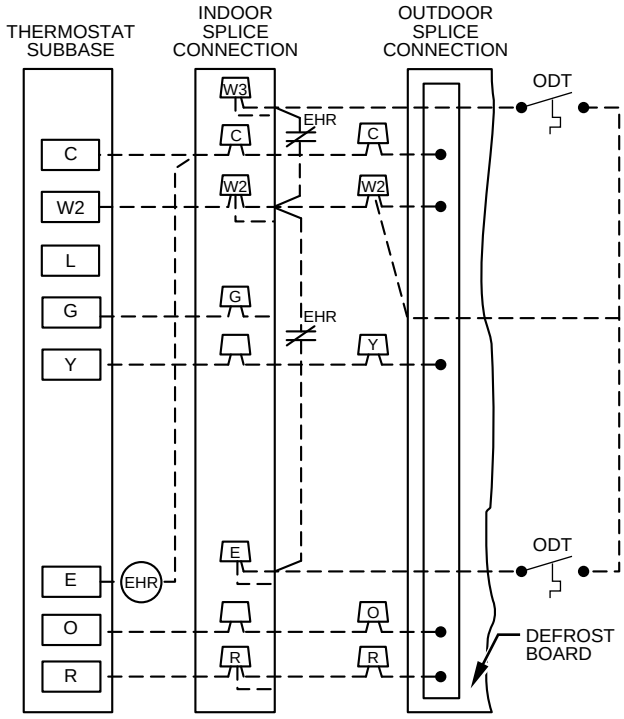
SYSTEM WITH ONE OUTDOOR THERMOSTAT



USED WITH FB4, FB5, FC4, FA4, FH4 FAN COILS
(WITH 1 OUTDOOR TSTAT)

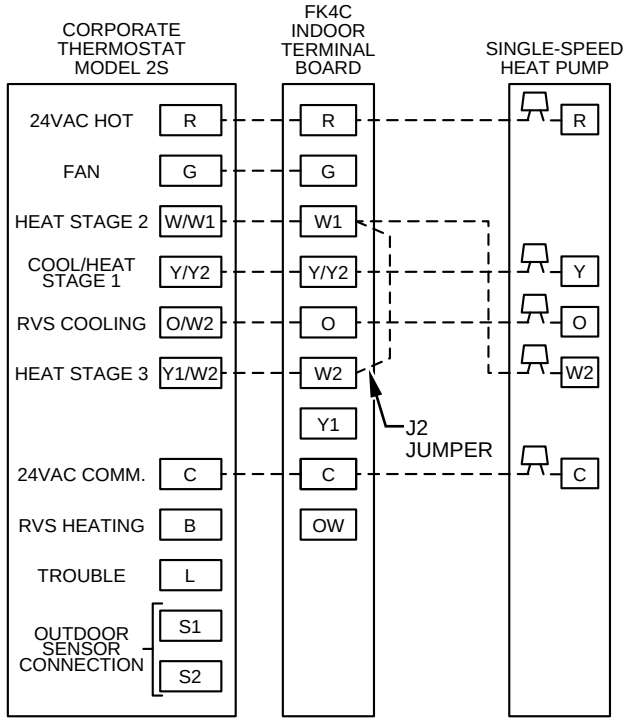
A96530

SYSTEM WITH TWO OUTDOOR THERMOSTATS



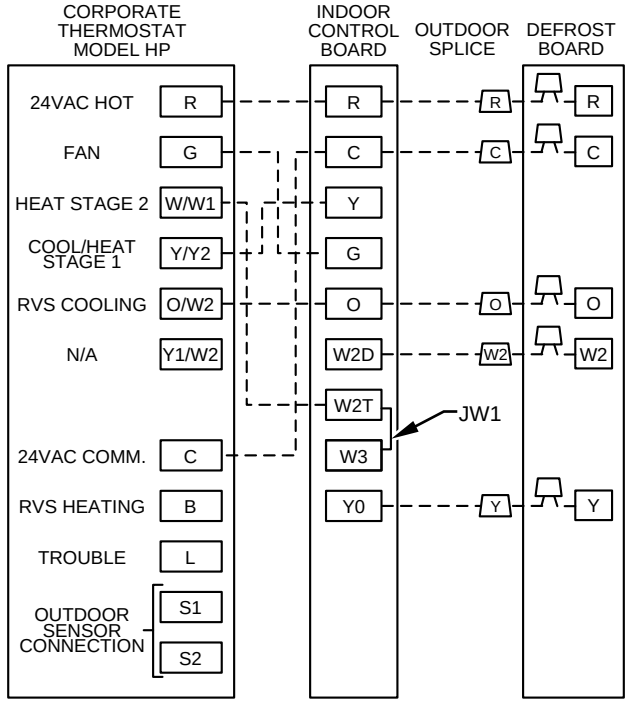
USED WITH FB4, FB5, FC4, FA4, FH4 FAN COILS
(WITH 2 OUTDOOR TSTATS)

A96531



USED WITH FK4C FAN COIL
(CUT J2 JUMPER)

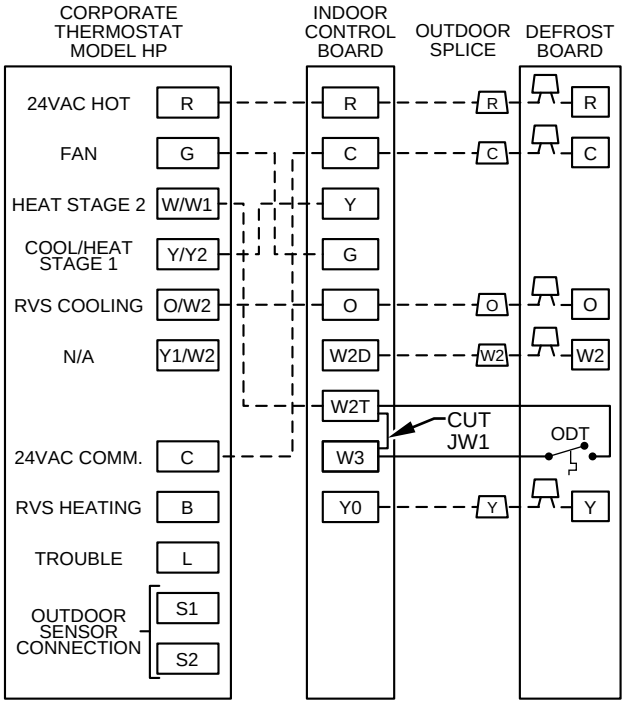
A96536



WITHOUT OUTDOOR THERMOSTAT

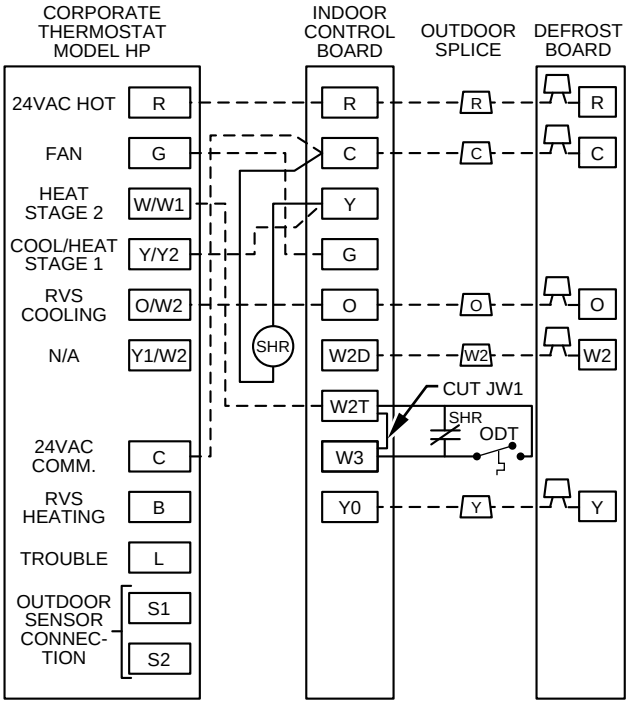
A96537

Fig. 12—Typical Circuit Connections (continued)



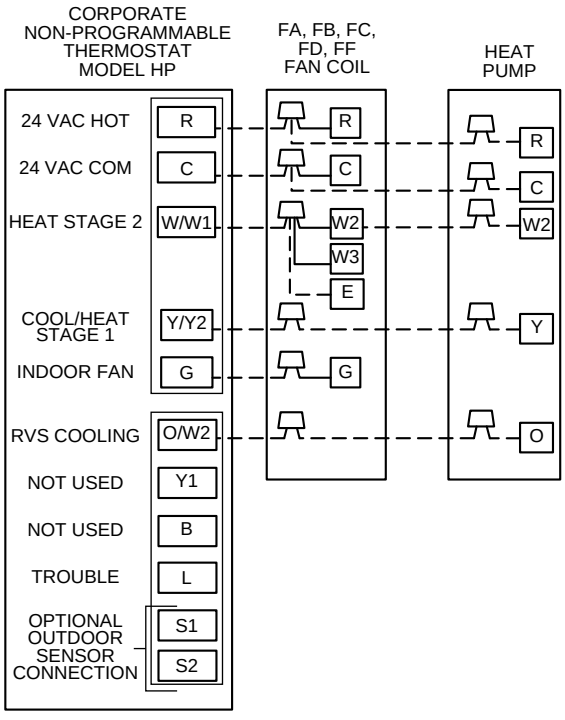
WITH 1 OUTDOOR THERMOSTAT

A96538



WITH SUPPLEMENTAL HEAT RELAY AND WITH 1 OUTDOOR THERMOSTAT

A96539



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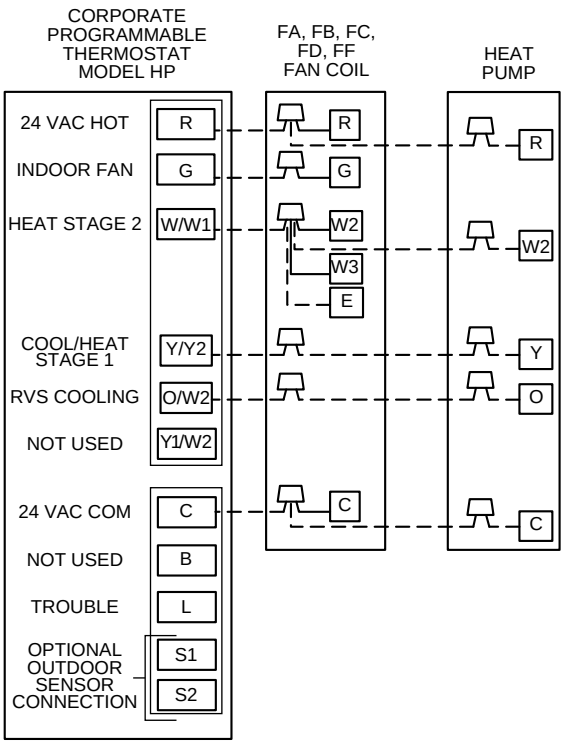

A96541

Fig. 12—Typical Circuit Connections (continued)

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